Seven New Species of *Pilea* Lindley (Urticaceae) from Mesoamerica

A. K. Monro
Department of Botany, Natural History Museum, Cromwell Road, London SW7 5BD, United Kingdom

ABSTRACT. Seven new species of *Pilea* from Mesoamerica are described and illustrated: *Pilea pteridophylla* A. K. Monro, *P. plumulosa* A. K. Monro, *P. tripartita* A. K. Monro, *P. rostulata* A. K. Monro, *P. quadrata* A. K. Monro, *P. tutensis* A. K. Monro, and *P. magnicarpa* A. K. Monro. Their affinities are discussed and positions within Weddell's and Killip's subdivisions of the genus indicated.

Pilea is a genus mainly composed of small shade-loving herbs and is distributed throughout the tropics, subtropics, and temperate regions (with the exception of Australia, New Zealand, and Europe), with the greatest diversity in the Greater Antilles. *Pilea* can be distinguished from other Mesoamerican Urticaceae by opposite leaves and a single ligulate intrapetiolar stipule in each axil. Cystoliths, found on the stem, leaves, and frequently inflorescence, vary greatly within and between species, but are distinctive in frequently appearing branched, forming "V," "Y," and "X" shapes.

The last major worldwide taxonomic treatment of the genus *Pilea* was H. A. Weddell's treatment of 1869, in which 159 species were recognized (24 of which were described as new). Since then, over 500 new species names have been published, and it is likely that there are over 500 to 600 "good" species worldwide (Adams, 1970; Burger, 1977). Major contributions to the taxonomy of neotropical *Pilea* have been made by E. P. Killip in his revision of the Andean species (Killip, 1936, 1939), P. C. Standley and J. A. Steyermark (1952) in their treatment for the *Flora of Guatemala*, C. D. Adams (1972) in his treatment for the *Flowering Plants of Jamiaca*, and W. C. Burger (1977) in his treatment for *Flora Costaricensis*. Weddell (1869) subdivided the genus, on the basis of leaf morphology, into three principal species groups: *Integrifoliae*, with leaves of equal length at each node and entire margins; *Heterophyllae*, with leaves of unequal length at each node; and *Dentatae*, with leaves of equal length at each node and toothed margins. Killip (1936) subdivided *Pilea* into 12 species groups, based largely on those of Weddell's conspecti of 1856 and 1869. In the absence of recent phylogenetic analysis, the new species described here are best placed in three of the subgeneric groups cited in this article: *Fallaces*, *Molles*, and *Centradenoideae*. These three subgeneric groups can be recognized on the following suites of characters: subgenus *Fallaces* with toothed pinnately nerved leaves, where no pair of the secondary nerves are more prominent than the others; subgenus *Molles* with pubescent, toothed, 3-nerved or pinnately nerved leaves (where pinnately nerved a basal pair of secondary veins is markedly more prominent than the others), of equal size at each node, averaging more than 2 cm in length and compact staminate inflorescences where the peduncles are longer than the panicle branches; subgenus *Centradenoideae* with 3-nerved or pinnately nerved leaves (where pinnately nerved a basal pair of secondary veins is much more prominent than the others), of unequal size at each node, the smaller leaf at each node symmetrical, with stipules less than 3 cm long and pedunculate pistillate inflorescences.

In preparing revisionary accounts of *Pilea* for *Flora Mesoamericana*, over 1700 collections from Central and South America were examined. During the course of this work, the following seven new species were identified.

Pilea pteridophylla A. K. Monro, sp. nov. TYPE: Mexico. Tabasco: Sierra el Madrigal, Teapa, Tabasco, a 600 m al E del edificio principal del Centro Regional Tropical Puyacatengo de la Universidad Autónoma de Chapingo, 5 June 1991, *A. M. Hanan A. 438* (holotype, MEXU). Figure 1A, B.

Species foliis pectinatis a congeneribus diversa.

Herb to 35 cm, perennial; epipetric, monoecious. *Stems* erect, sparsely branched, rooting at the base; internodes 2–8 × 1.5–2.5 mm, weakly striate, drying dark green, glabrous, cystoliths not visible. *Blades of leaves* at the same node of equal length, petiolate, 45–90 × 7–12 mm, linear-lanceolate,

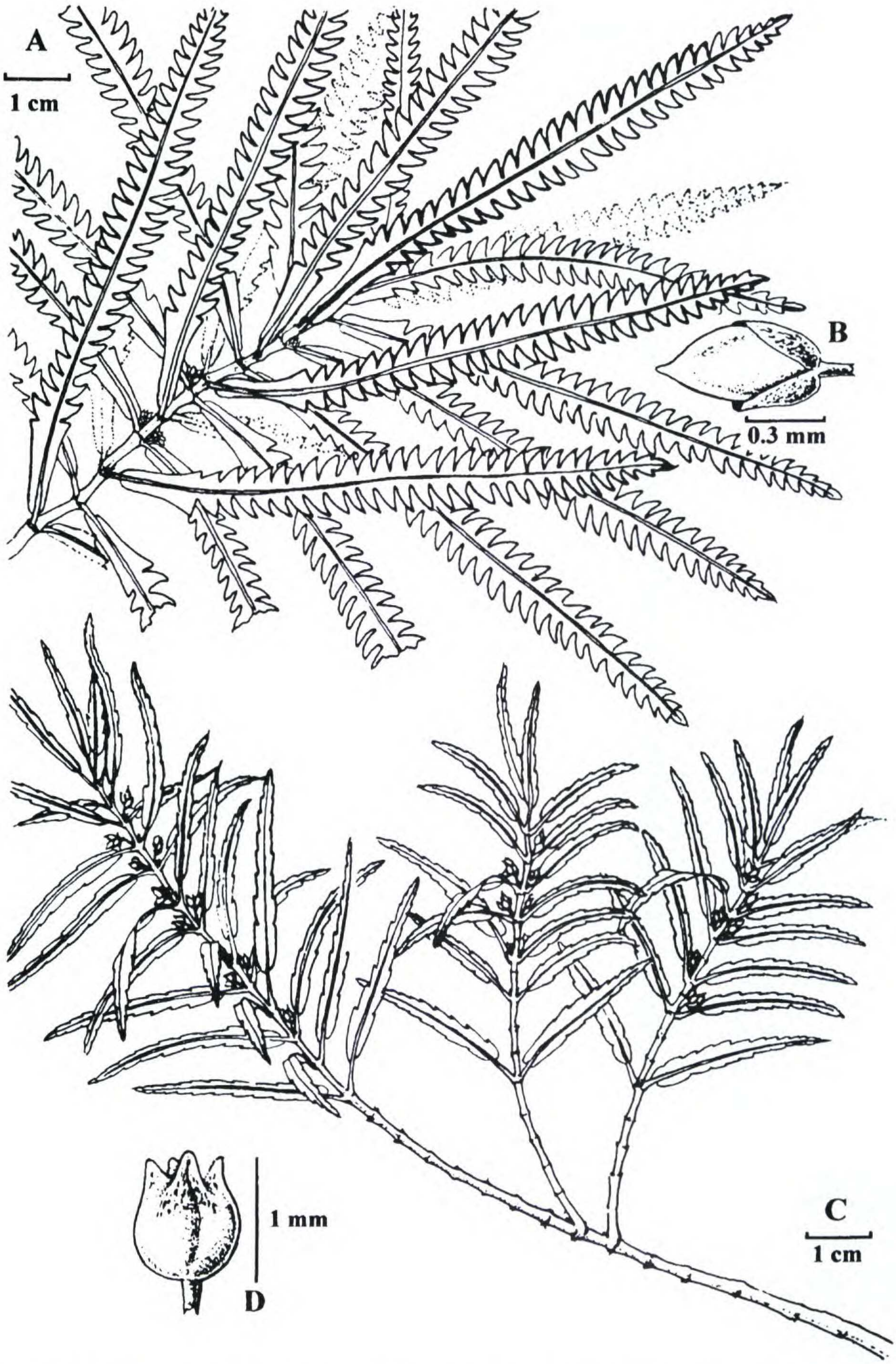

Figure 1. A, B. *Pilea pteridophylla* A. K. Monro. —A. Habit, plant with pistillate inflorescences. —B. Fruit. C, D. *Pilea plumulosa* A. K. Monro. —C. Habit, plant with infructescences. —D. Staminate flower prior to anthesis. A and B based on *Hanan 438*. C and D based on *Kirkbride & Duke 944*.

pectinate above the basal ⅛ to ⅙, chartaceous; adaxial surface drying dark green, glabrous, cystoliths fusiform, V-, Y-, and X-shaped; abaxial surface drying dark gray-green, glabrous, cystoliths fusiform, V-, Y-, and X-shaped, punctate glandular; base asymmetrical, decurrent, attenuate, rounded; apex symmetrical, weakly cuspidate; primary venation pinnate, secondary veins 19–28 pairs, 75–

90° to the midrib; petioles equal, 0.8–1.3 × ca. 0.8 mm, glabrous; stipules 0.8–1.0 × 1.0–1.3 mm, deltate, membranous, gray, persistent. *Inflorescences* 7–24 per stem, unisexual, pistillate inflorescences preceding and concurrent with staminate inflorescences; peduncle and pedicels subtended by stipuliform bracts, peduncular bract 0.5–0.8 mm, deltate, pedicellular bracts ca. 0.4 mm, narrow deltate; intact staminate inflorescences not seen; flowers in bud immediately prior to anthesis 1.0–1.3 × 0.8–1.3 mm, cream, apically green; tepals 4, ca. 1.3 mm, ovate, glabrous; subapical appendages ca. 0.3 mm, ridge-like, glabrous; stamens 4, filaments ca. 1.3 mm, anthers ca. 0.4 × ca. 0.5 mm; pistillate inflorescences 1 or 2 per axil, 1.5–2.0 mm, bearing 5–35 flowers in a loose panicle, peduncle ¼ to ⅓ inflorescence length, ca. 0.4 mm diam., glabrous; pedicels ca. 0.3 × ca. 0.1 mm to inconspicuous, glabrous; flowers 0.5–0.7 × ca. 0.3 mm, glabrous; tepals 3, unequal, the central one ca. 0.5 mm, oblong with a dorsal thickening, the two lateral ca. 0.5 mm, ovate, lacking a dorsal thickening. *Infructescences* ca. 2–3 mm, peduncle 0.5 mm diam.; fruit 0.7–0.8 × ca. 0.4 mm, asymmetrical, subcompressed ovoid, orange-brown, the margin broadening and flattened toward the apex.

Distribution. Known only from the type collection, growing in evergreen forest in Tabasco, southern Mexico.

Discussion. This species falls within Weddell's *Dentatae* and Killip's *Fallaces* species groups. It is unmistakable on account of its pectinate leaves. These resemble the fronds of a fern in color and texture as well as shape (Fig. 1A). It is the only species of *Pilea* with pectinate leaves known from the Americas.

Pilea plumulosa A. K. Monro, sp. nov. TYPE: Panama. Bocas del Toro-Chiriquí border: elfin forest at continental divide on Chiriquisito–Caldera trail, 20 Apr. 1968, *J. H. Kirkbride & J. A. Duke 944* (holotype, MO [sheet no. 2605434]; isotypes, MO [sheet no. 2090983], NY). Figure 1C, D.

Species *P. killipianae* Standley & Steyermark affinis, sed floribus staminalibus minimis, seminibus majoribus, differt.

Shrublet to 25 cm, perennial; epipetric, monoecious. *Stems* erect, branched, rooting at the base; internodes 3.0–10.5 × 1–2 mm, weakly striate, drying gray-brown, glabrous, cystoliths elliptic, becoming obscure with age. *Blades of leaves* at the same node of equal length, petiolate, 12–38 × 1.5–4.0 mm, linear-lanceolate, chartaceous; adaxial surface drying dark brown-green, glabrous, cystoliths fusiform; abaxial surface drying yellow-green, glabrous, cystoliths orbicular, punctate glandular; base asymmetrical, subcordate and cuneate, acute; margin crenate with basal ¼ to ⅓ entire; apex symmetrical, acute; primary venation pinnate, occasionally appearing 3-nerved, where appearing 3-nerved then lateral nerves much less prominent than the midrib, running ⅓ to ¼ the length of the leaf, secondary veins 4–13 pairs, 30–45° to the midrib; petioles unequal in pair by ratio 1:2.0–4.5, the longer 2.3–4.5 × 0.5–0.8 mm, the shorter 1.0–1.8 × 0.5 mm, glabrous; stipules 0.5–0.8 × 0.5 mm, ovate, membranous, brown, persistent. *Inflorescences* 6–28 per stem, unisexual, pistillate inflorescences preceding and concurrent with staminate inflorescences; peduncle and pedicels subtended by stipuliform bracts, peduncular bract ca. 0.5 mm, deltate, ovate, pedicellular bracts 0.4–0.8 mm, ovate; staminate inflorescences 1 or 2 per axil, 3.5–7.0 mm, bearing 6–10 flowers in a single compact head; peduncle ½ to ⅔ inflorescence length, ca. 0.3 mm diam., glabrous; pedicels 0.8–1.3 × ca. 0.1 mm, glabrous; flowers in bud immediately prior to anthesis 1.0–1.3 × 1.0–1.3 mm, cream; tepals 4, ca. 1.5 mm, ovate, elliptic, glabrous; subapical appendages ca. 0.3 mm, ridge-like, glabrous; stamens 4, filaments ca. 2 mm, anthers ca. 0.5 × ca. 0.5 mm; pistillate inflorescences 1 or 2 per axil, ca. 3 mm, bearing 5–8 flowers in a single compact head, peduncle ⅓ inflorescence length, ca. 0.1 mm diam., glabrous; pedicels 0.3–0.5 × ca. 0.1 mm, glabrous; flowers ca. 0.8 × ca. 0.5 mm, glabrous; tepals 3, unequal, the central one ca. 0.8 mm, oblong-obovate, with a dorsal thickening, the lateral two ca. 0.7 mm, ovate, without a dorsal thickening. *Infructescences* 3.0–4.5 mm, peduncle ca. 0.1 mm diam.; fruit ca. 1.5 × ca. 1.0 mm, asymmetrical, subcompressed elliptic, pale brown, the margin narrow, thickened.

Distribution. Known only from the type collection made in the western end of the Cordillera Central in Panama, where it was growing on rocky outcrops in elfin forest.

Discussion. This species falls within Weddell's *Dentatae* and Killip's *Fallaces* species groups. A sterile collection from Chiriquí, *Dwyer & Lallathin 8769* (MO), collected at 4500–5500 m, resembles *P. plumulosa*. *Pilea plumulosa* most closely resembles *P. killipiana* from Chiapas (Mexico) and Guatemala, differing as summarized below:

Pilea killipiana: sparsely branched or unbranched, the leaf-bearing part of the stem her-

baceous; staminate flowers in bud immediately prior to anthesis 1.8–2.0 mm; fruit ca. 0.8 mm.

Pilea plumulosa: extensively branched, the leaf-bearing part of the stem woody; staminate flowers in bud immediately prior to anthesis 1.0–1.3 mm; fruit ca. 1.5 mm.

From the available collections, the distributions of the two species do not appear to overlap: *P. killipiana* is known only from Chiapas in southern Mexico and the states of the Petén and Alta Verapaz in northern Guatemala, while *P. plumulosa* is known only from western Panama.

This species is named for the feather-like outline of the leaves.

Pilea tripartita A. K. Monro, sp. nov. TYPE: Costa Rica. San José-Cartago border: summit of the Interamerican Highway at 3200–3300 m altitude near La Asunción, 21 Nov. 1969, *W. C. Burger & R. L. Liesner 6330* (holotype, MO; isotypes, NY, US). Figure 2A, B.

Species *P. cornuto-cucullatae* Cufodontis similis, sed floribus staminalibus tripartitis, seminibus majoribus, differt.

Herb to 25 cm, perennial; terrestrial, epiphytic or epipetric; monoecious. *Stem* erect or repent, sparsely branched, rooting at base and adventitiously where repent; internodes 12–60 × 1.5–2.0 mm, weakly striate, drying green to pale brown, pubescent, the hairs to 0.8 mm, upright or weakly appressed, curved, cystoliths fusiform. *Blades of leaves* at the same node of equal length, petiolate, 12–40 × 10–20 mm, elliptic to ovate, chartaceous; adaxial surface drying dark green, glabrous to sparsely pubescent on the midrib, where pubescent the hairs to 0.8 mm, weakly appressed, curved, cystoliths fusiform; abaxial surface drying olive green, glabrous to pubescent on the primary and secondary veins, where pubescent the hairs to 0.8 mm, appressed, curved, cystoliths fusiform or minute pusticulate, eglandular; base asymmetrical, weakly decurrent to cuneate; margin serrate; apex acute; primary venation 3-nerved, the two lateral nerves stopping short of the leaf apex, secondary veins 4–6 pairs, 30–45° to the midrib; petioles equal or unequal in pair by ratio of 1:1.5–3.0, 10–40 × 0.5 mm, pubescent, the hairs to 0.8 mm, weakly appressed, weakly curved; stipules 4–6 × 2–3 mm, oblong, obovate, membranous, red-brown, persistent. *Inflorescences* 1–6 per stem, unisexual, pistillate inflorescences preceding staminate inflorescences; peduncle and pedicels subtended by a stipuliform bract, peduncular bract 1.0–1.3 mm, ovate, pedicellular bracts 0.8–1.3 mm, deltate; staminate inflorescence 1 per axil, 5–45 mm, bearing 5–9 flowers in a single compact head; peduncle ⅔ to ¾ inflorescence length, 0.5 mm diam., glabrous; pedicels 1–2 × 0.5 mm, glabrous; flowers in bud immediately prior to anthesis 2.5–3.5 × 1.5–2.0 mm; tepals 1.0–1.5 mm, 3, ovate, glabrous; subapical appendages 1.5–3.0 mm, narrow ovate, glabrous; stamens 3, filaments 2.0–2.5 mm, anthers 0.5 × 1.0 mm; pistillate inflorescences 1 or 2 per axil, 10–25 mm, bearing 8–20 flowers in a single compact head; peduncle ⅔ to ¾ inflorescence length, 0.5 mm diam., glabrous; pedicels 0.5–0.8 × 0.5 mm, glabrous; flowers 1.0–1.5 × 0.8–1.0 mm, glabrous; tepals 3, unequal, the central one 1.0–1.5 mm, ovate, the lateral two 0.8 mm, lanceolate. *Infructescences* 12–50 mm, peduncle 0.5 mm diam.; fruit 2–3 × 1.5–2.0 mm, asymmetrical, compressed ovoid, glabrous, the margin narrow, thickened.

Distribution. Central Costa Rica at 2500–3200 m, in forest on, or close to riverbanks and by the side of forest tracks, growing on tree trunks and rocks.

Discussion. This species falls within Weddell's *Dentatae* and Killip's *Molles* species groups. Burger (1977: 254) equated this species with *Pilea cornuto-cucullata*, another Costa Rican species. Although no representative collections are cited in *Flora Costaricensis*, collections determined by Burger as *P. cornuto-cucullata* constitute the type collection for *P. tripartita* as well as one of the paratype collections (*Burger & Liesner 6509*).

Pilea tripartita A. K. Monro most closely resembles *P. cornuto-cucullata*, differing as summarized below:

P. cornuto-cucullata: staminate flowers 4-parted, subapical appendage 0.5–1.0 mm; fruit ca. 1.5 mm.

P. tripartita: staminate flowers 3-parted, subapical appendage 1.5–3.0 mm; fruit 2–3 mm.

To a lesser extent, *Pilea tripartita* also resembles *P. fallax* Weddell from western Venezuela, Colombia, and Ecuador, distinguished as outlined below:

P. fallax: stipules auriculate, gray to gray-brown in color; leaves pinnately nerved (no secondary nerves more prominent than the others); pistillate inflorescences bearing 3–7 flowers.

P. tripartita: stipules oblong to obovate, red-brown in color; leaves 3-plinerved; pistillate inflorescences bearing 8–20 flowers.

Paratypes. COSTA RICA. **Limón:** cantón de Talamanca, sendero entre Cerro Dúrika y sabanas de Dúrika, siguiendo el cauce de la quebrada intermitente, 9°24′30″N, 83°18′35″W, 2500 m, 21 Oct. 1989, *Herrera 3752* (BM, MO not seen). **San José-Cartago border:** about 22 km SE of Empalme, along the Interamerican

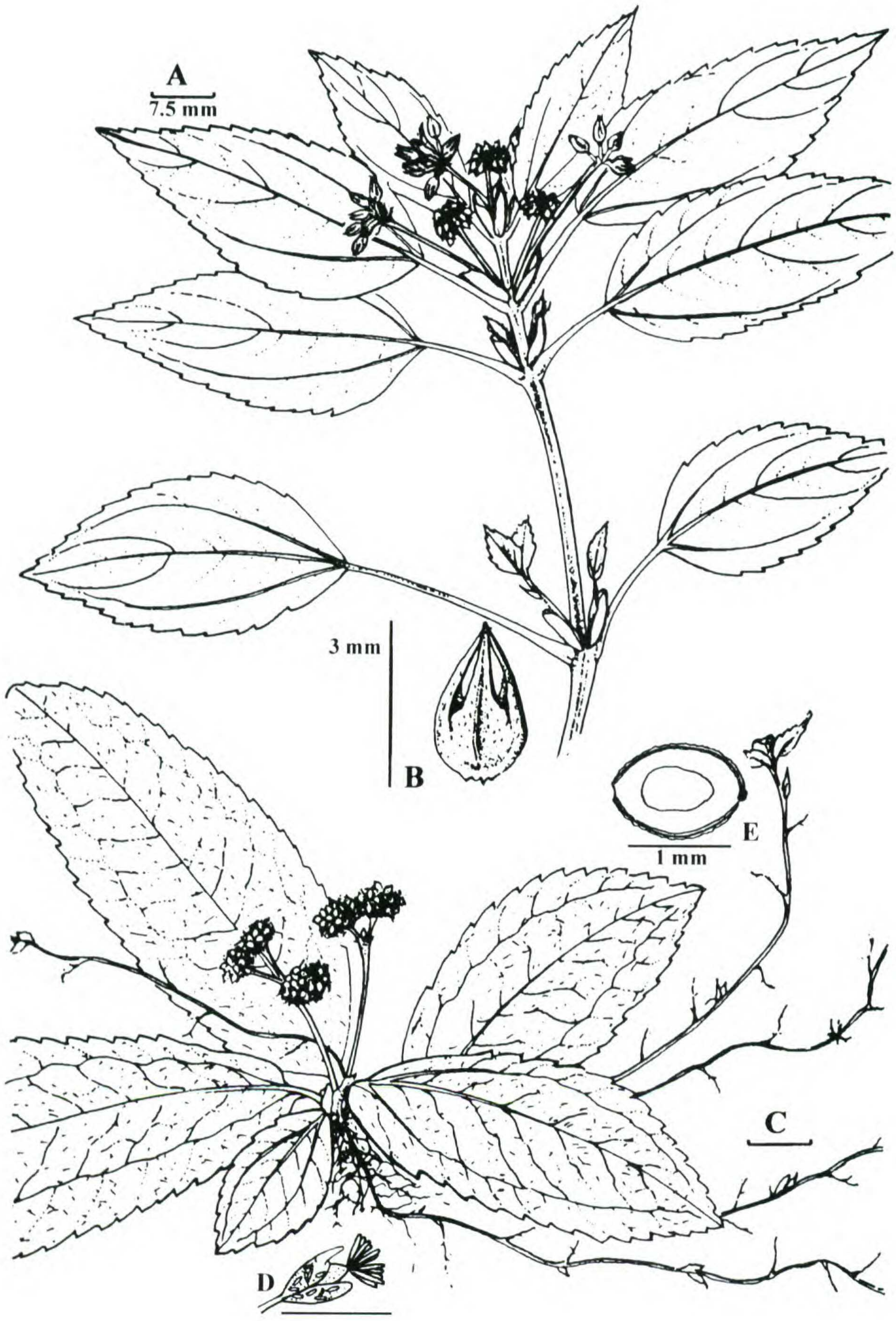

Figure 2. A, B. *Pilea tripartita* A. K. Monro. —A. Habit, plant with staminate inflorescences and infructescences. —B. Staminate flower prior to anthesis. C–E. *Pilea rostulata* A. K. Monro. —C. Habit, plant with infructescences and stoloniferous stems. —D. Pistillate flower. —E. Fruit. A and B based on *Burger & Liesner 6330*. C and E based on *Antonio 1237*. D based on *Mori et al. 6449*.

Highway at 2500–2600 m, 9°40′N, 83°50′W, 27 Nov. 1969, *Burger & Liesner 6509* (F, MEXU).

Pilea rostulata A. K. Monro, sp. nov. TYPE: Panama. Colón: along the Río Guanche, elev. 400 m, 5 July 1979, *Antonio 1237* (holotype, BM; isotype, MO). Figure 2C.

Species *P. involucratae* (Sims) Urban similis, sed caulibus stoloniferis, foliis basi cordatis, floribus pistillatis dorsaliter appendiculatis, differt.

Herb to 10 cm, perennial; epiphytic or epipetric, dioecious or monoecious. *Stems* stoloniferous from rootstock, otherwise unbranched, erect, rooting at base and adventitiously; internodes 2–7 × 1.0–1.5 mm, weakly striate, drying dark brown, pubescent, the hairs to 1 mm, upright or weakly appressed, straight or weakly curved, cystoliths elliptic. *Blades of leaves* at the same node of equal length, petiolate, 17–120 × 10–35 mm, obovate, elliptic, smaller leaves frequently suborbicular, subchartaceous to chartaceous; adaxial surface drying dark green to brown-green, pubescent, the hairs to 1.5 mm, upright, weakly curved or straight, cystoliths fusiform, V-shaped; abaxial surface drying gray-green, pubescent as the adaxial surface, cystoliths disc-shaped, fusiform, V-shaped, punctate glandular; base asymmetrical, cordate; margin serrate, basal ¼ entire; apex symmetrical, obtuse to acute; primary venation 3-plinerved, the two lateral nerves stopping short of the leaf apex, secondary veins 6–10 pairs, 45–65° to the midrib; petioles equal, 2–15 × 0.8–1.0 mm, pubescent, the hairs to 1.5 mm, upright, weakly curved or straight; stipules 4–9 × 2.5–3.5 mm, ovate-oblong, obovate, membranous, pale brown to dark brown, persistent. *Inflorescences* 1 or 2 per stem, unisexual, rarely bisexual, peduncle and pedicels subtended by stipuliform bracts, peduncular bract 1.0 mm, narrowly ovate, pedicellular bracts 0.5–0.8 mm, broadly ovate; staminate inflorescences solitary, 37–55 mm, bearing 12–20 flowers in a compact head; peduncle ¾ to ⅞ inflorescence length, 0.8–1.3 mm diam., glabrous; pedicels 0.8–2.0 × 0.3 mm, glabrous; flowers in bud immediately prior to anthesis 2.8–3.0 × 1.3–1.5 mm, pale green; tepals (2)4, 2.0–2.8 mm, ovate, glabrous; subapical appendages 1.0–1.5 mm, narrowly ovate, glabrous; stamens (2)4, filaments 2.0–2.5 mm, anthers 0.5 × 1.0 mm; pistillate inflorescences 1 or 2, 12–45 mm, bearing 100–250 flowers in a loose panicle or 1–3 compact panicles, rarely with a few staminate flowers; peduncle ⅔ to ¾ inflorescence length, 1.0 mm diam., glabrous; pedicels 0.5–1.0 × 0.1–0.2 mm, glabrous; flowers 0.8–1.0 × 0.4–0.5 mm, glabrous; tepals 3, unequal, glabrous, the central one 0.8–1.0 mm, obovate, with a dorsal subapical appendage 0.5–1.0 mm long, the lateral two 0.8 mm, asymmetrically ovate, lacking any appendages. *Infructescences* 23–60 mm, peduncle 0.5–1.0 mm diam.; fruit 1.3 × 0.8–1.0 mm, symmetrical or asymmetrical, compressed elliptic, orange-brown to dark brown, the margin crenulate, submarginal ridge present.

Distribution. Known only from the Caribbean side of central Panama where it is found growing in damp shady places on, or close to, riverbanks, at an altitude of 0–400 m.

Discussion. This species falls within Weddell's *Dentatae* and Killip's *Molles* species groups. *Pilea rostulata* most closely resembles *P. involucrata*, which is known from Costa Rica to Colombia and Venezuela and the Windward Isles. It differs as summarized below:

P. involucrata: terrestrial, stolons absent; leaf margin crenate, basal ⅓ to ½ entire; leaf base obtuse or attenuate or decurrent; tepals of the pistillate flowers lacking a subapical appendage.

P. rostulata: epiphytic or epipetric, stolons present; leaf margin serrate, basal ¼ entire; leaf base cordate; broader tepal of the pistillate flowers with a dorsal subapical appendage ca. 1 mm in length.

Paratypes. PANAMA. **Colón:** near Río Guanche, 17 July 1971, *Dressler 4056* (BM, MO); Río Guanche, ca. 2.5 km upriver from bridge on road to Portobelo, 3 June 1975, *Mori et al. 6449* (BM, MO); Río Guanche, 2.5 km upstream from the bridge on the road to Portobelo, 27 Aug. 1975, *Mori & Witherspoon 7952a* (MO); walking upstream from bridge over Río Guanche, 0–50 ft., 27 May 1980, *Antonio 4778* (MO); walking upstream from bridge over Río Guanche, 0–50 ft., 27 May 1980, *Antonio 4779* (MO); Río Guanche above bridge on Portobelo Road, ca. 3–5 km above bridge, 50–200 m, 8 July 1976, *Croat 36941* (MO); to Río Iguanita, 390 m, 7 Apr. 1977, *D'Arcy 11254* (MO); S approach to Cerro Bruja from Río Escandaloso, ridge top, 20 May 1978, *Hammel 3216* (MO).

Pilea quadrata A. K. Monro, sp. nov. TYPE: Panama. Colón: along Río Escandaloso near mina boquerón Numero 2, 250 m elev., 14 July 1979, *T. Antonio 1345* (holotype, MO). Figure 3A–C.

Species a *P. ecboliophylla* Donnell Smith inflorescentiis staminalis brevibus, inflorescentiis pistillatis multo paucifloris, differt.

Herb to 25 cm, perennial; terrestrial, epiphytic or epipetric, monoecious. *Stems* erect, repent, sparsely branched, rooting at base and adventitiously where repent; internodes 7–15 × 0.5–0.8 mm, weakly striate, square in cross section, drying gray-green, glabrous, cystoliths elliptic. *Blades of leaves* at the same node of unequal length by ratio 1:4.5–13.0, the major leaves petiolate, 23–51 ×

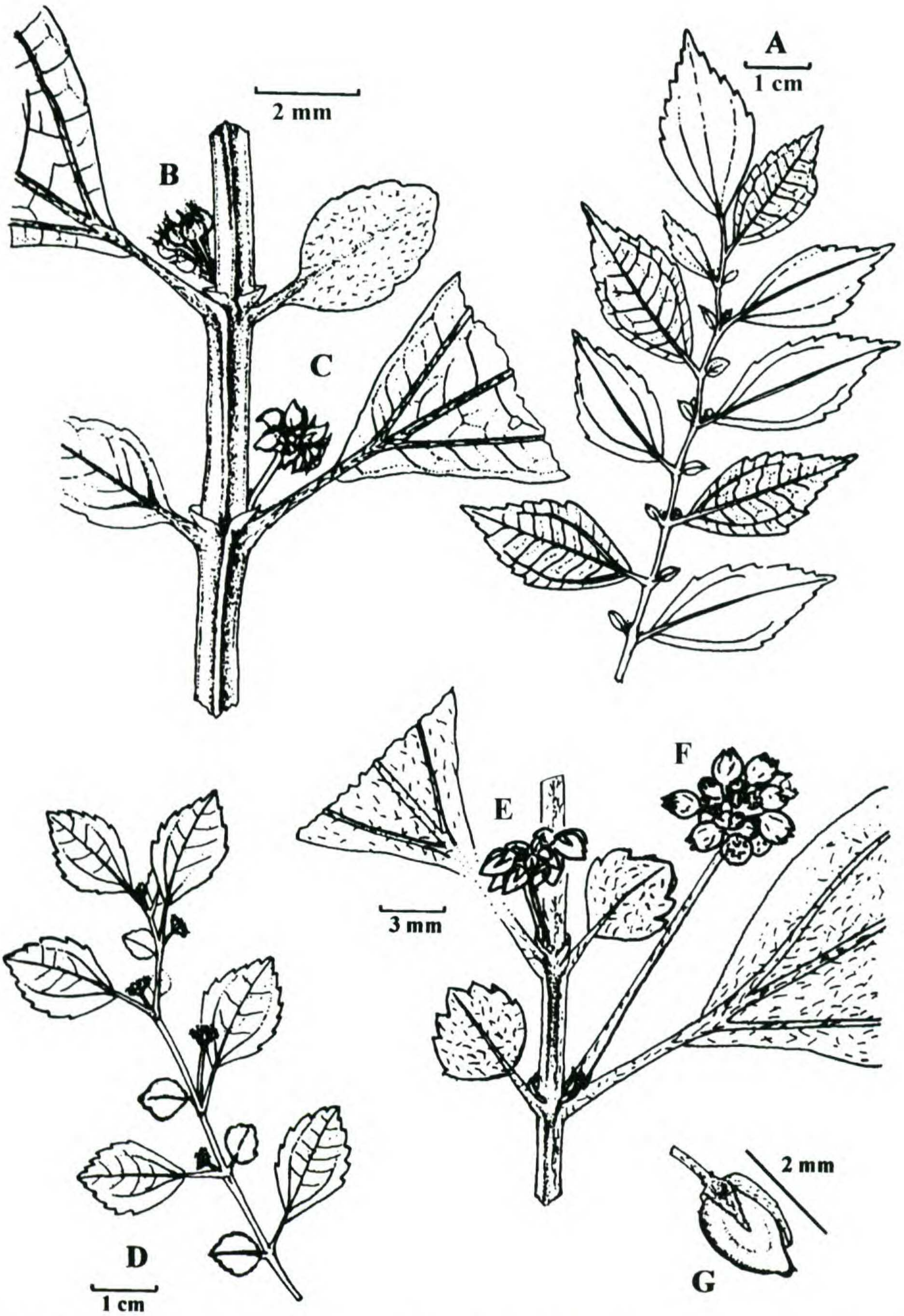

Figure 3. A–C. *Pilea quadrata* A. K. Monro. —A. Habit, plant with staminate inflorescences. —B. Staminate inflorescence. —C. Infructescence. D–G. *Pilea tutensis* A. K. Monro. —D. Habit, plant with staminate inflorescence and infructescences. —E. Infructescence. —F. Staminate inflorescence. —G. Fruit. A based on *Liesner 1195*. B and C based on *Antonio 1345*. D–G based on *Witherspoon et al. 8860*.

11–18 mm, ovate, elliptic, rhomboid, subchartaceous; adaxial surface drying dark gray-green, glabrous, cystoliths fusiform, V-shaped, occasionally Y-shaped; abaxial surface drying pale brown-green or pale gray-green, glabrous, cystoliths fusiform, V-shaped, disc-shaped, occasionally Y-shaped, punctate glandular; base asymmetrical, decurrent and obtuse, decurrent and acute; margin serrate, basal ½ to ⅔ entire; apex symmetrical, acute to weakly acuminate; primary venation 3-nerved or 3-pli-

nerved, the two lateral nerves visible for ½ to ⅔ of the leaf length, secondary veins 6–9 pairs, 65–80° to the midrib, tertiary venation clearly visible; the minor leaves subsessile to sessile, 4–5 × 2 mm, elliptic, ovate, obovate, the leaf base strongly asymmetrical, decurrent and obtuse or cuneate, the leaf apex asymmetrical, acute to obtuse, otherwise as major leaves; petioles of the major leaves 1.5–2.5 × 0.5–0.8 mm, glabrous; stipules 0.5–0.8 × 0.8 mm, ovate, membranous, brown, persistent. *Inflorescences* 2–30 per stem, unisexual, pistillate inflorescences concurrent with staminate inflorescences, peduncle and pedicels subtended by stipuliform bracts, peduncular bract 0.3–0.5 mm, ovate, obscure, pedicellular bracts 0.3–0.5 mm, narrowly ovate; staminate inflorescences solitary, 1.5–2.0 mm, bearing 5–12 flowers in a compact head, appearing fasciculate; peduncle ¼ inflorescence length, glabrous; pedicels 0.8–1.5 mm, glabrous; flowers in bud immediately prior to anthesis 0.8–1.0 × 0.8–1.0 mm, cream; tepals 4, 1 mm, ovate, glabrous; subapical appendages 0.3–0.5 mm, corniculate, glabrous; stamens 4, filaments 1 mm, anthers 0.5 × 0.8 mm; pistillate inflorescence solitary, 1.0–2.5 mm, bearing 5–8 flowers in a compact head; peduncle ¼ to ½ inflorescence length, 0.3 mm diam., glabrous; pedicels 0.3 × 0.3 mm to inconspicuous, glabrous; flowers ca. 0.5 × ca. 0.3 mm, glabrous; tepals 3, unequal, the central one 0.5 mm, ovate to oblong, the lateral two 0.3–0.5 mm, asymmetrically ovate. *Infructescences* ca. 2.5 mm, peduncle ca. 0.3 mm diam.; fruit ca. 1.0 × 0.8 mm, symmetrical, compressed, elliptic, the margin not thickened.

Distribution. Central Panama, forest understory and riverbanks at 200–500 m.

Discussion. This species falls within Weddell's *Heterophyllae* and Killip's *Centradenioideae* species groups. *Pilea quadrata* most closely resembles *P. ecboliophylla*, which is found throughout Mesoamerica. They differ as summarized below:

P. ecboliophylla: stem an irregular circle in cross section; staminate inflorescences 6–25 mm, bearing 24–60 flowers, appearing paniculate; pistillate inflorescences bearing 12–200 flowers.

P. quadrata: stem square to rhombic in cross section; staminate inflorescences 1.5–2.0 mm, bearing 5–12 flowers, appearing fasciculate; pistillate inflorescences bearing 5–8 flowers.

Paratypes. PANAMA. **Panamá:** along El Llano–Cartí–Tupile road, 12 mi. above Pan-American Hwy., 200–250 m, 26–27 Mar. 1973, *Liesner 1195* (GH, MO, US); El Llano to Cartí Road, 13.7 km N of Pan-American Highway, San Blas border, 1 June 1977, *Folsom 3498* (MO); El Llano to Cartí Road, 12 km N of Pan-American Highway at El Llano, ca. 400 m, 11 Mar. 1974, *Nee 10452* (US).

Pilea tutensis A. K. Monro, sp. nov. TYPE: Panama. Veraguas: Cerro Tute, slopes up to 4000 ft., trail past agricultural school near Santa Fé, 17 Sep. 1979, *T. Antonio 1845* (holotype, MEXU; isotypes, MO, NY). Figure 3D–G.

Species *P. tilaranae* W. Burger similis, sed floribus staminalis plurimis, pedicellis florium staminalium longioribus, petiolio foliorum minorum longioris.

Herb to 35 cm, perennial; terrestrial, epiphytic, monoecious. *Stem* erect, repent, sparsely branched, rooting at base and adventitiously where repent; internodes 6–17 × 0.8–1.0 mm, weakly striate, drying dark brown, glabrous; cystoliths elliptic. *Blades of leaves* at a node of unequal length by ratio 1:2–4; the major leaves petiolate, 19–30 × 11–18 mm, elliptic, obovate, chartaceous; adaxial surface drying dark brown to green-brown, glabrous, cystoliths fusiform; abaxial surface drying brown, glabrous, cystoliths fusiform, punctate glandular; base asymmetrical or symmetrical, cuneate, acute, weakly decurrent; margin crenate, basal ¼ to ⅓ entire; apex symmetrical, obtuse, weakly acuminate; primary venation 3-plinerved, the two lateral nerves visible for ⅔ of the leaf length, secondary veins 4–10 pairs, 65–90° to the midrib; the minor leaves petiolate, 6.0–9.5 × 3–7 mm; suborbicular to broad elliptic, otherwise as major leaves; petioles unequal by ratio 1:3.5–6, of the major leaf 4–12 × 0.8 mm, of the minor leaf 1–2 × 0.5 mm, glabrous; stipules 0.5–0.8 × 0.5–0.8 mm, broadly ovate to deltate, membranous, brown, persistent. *Inflorescences* 6–18 per stem, unisexual, pistillate inflorescences preceding or concurrent with staminate inflorescences, peduncle and pedicels subtended by stipuliform bracts, peduncular bract 0.30–0.8 mm, ovate to narrow ovate, pedicellular bracts 0.5 mm, narrowly deltate; staminate inflorescences solitary, 17–22 mm, bearing 50–80 flowers in a single compact head; peduncle ¾ inflorescence length, 0.5 mm diam., glabrous; pedicels 0.5–1.0 × 0.1 mm, glabrous; flowers in bud immediately prior to anthesis 1.8–2.0 × 1.0 mm, cream, apically green; tepals 4, 2 mm, ovate, glabrous; subapical appendages ca. 0.8 mm, corniculate; stamens 4, filaments ca. 1.5 mm, anthers ca. 0.5 × ca. 1.0 mm; pistillate inflorescences solitary, 2–4 mm, bearing flowers in a semi-compact to compact head; peduncle ⅓ to ½ inflorescence length, 0.1–0.3 mm diam., glabrous; pedicels 0.5–0.8 mm, glabrous; flowers 1.0–1.3 × 0.5–0.8 mm, glabrous; tepals 3, unequal, the central one 0.8–1.0 mm, oblong, the lateral two 0.5–0.8 mm, asymmetrically ovate. *Infructescences* 4–15

Figure 4. *Pilea magnicarpa* A. K. Monro. —A. Habit, plant with staminate inflorescences and infructescences (infructescences toward the base). —B. Pistillate flower. A and B based on *Hammel 4014*.

mm, peduncle 0.5 mm diam.; fruit 1.8–2.5 × 1.0–1.5 mm, asymmetrical, compressed ovoid, the margin dorsally thickened and ventrally flattened.

Distribution. Cerro Tute of the Cordillera Central in Central Panama, in forested and open areas at 900–1600 m.

Discussion. This species falls within Weddell's *Heterophyllae* and Killip's *Centradenioideae* species groups. *Pilea tutensis* most closely resembles *P. tilarana* from Costa Rica, differing as indicated below:

P. tilarana: minor leaf subsessile with petioles less than 0.3 mm; staminate inflorescences with ca. 15 flowers, staminate pedicel 1.3–1.5 mm.

P. tutensis: minor leaf petiole 1–2 mm; staminate inflorescences with 50–80 flowers, staminate pedicel 0.5–1.0 mm.

Paratypes. PANAMA. **Veraguas:** vicinity of Escuela Agrícola Alto Piedra near Santa Fé, 0.3 mi. beyond fork in road near the school, toward Atlantic slope, along trail to top of Cerro Tute, 3500–4100 ft., 30 Nov. 1979, *Antonio 2976* (MO); vicinity of Escuela Agrícola, Alto Piedra near Santa Fé .3 mi. beyond the fork in the road near the school, toward Atlantic slope along trail to top of Cerro Tute, 3200–3400 ft., 26 Jan. 1980, *Antonio 3486* (MO); along steep trail to summit of Cerro Tute ca. 3 km above Escuela Agrícola Alto Piedra near Santa Fé, 3000–3100 ft., 4 Jan. 1981, *Sytsma & Antonio 3059* (MO); Cerro Tute, E slopes, 1 km beyond Escuela Agrícola Alto Piedra above Santa Fé, low cloud forest, 900–1200 m, 14 May 1981, (MO); trail up E side of Cerro Tute, to 1200 m, 25 Oct. 1975, *Witherspoon et al. 8860* (MO, NY); trial on ridge to summit of Cerro Tute, Cordillera de Tute, 1 km past Escuela Agrícola Altos de Piedras, W of Santa Fé, 8°36′N, 81°06′W, 15 Dec. 1981, *Knapp & Sytsma 2600* (MO); Cerro Tute, W-slopes, forest, 850 m, 23 Oct. 1980, *Maas & Dressler 5030* (F); forested mountains W of Alto de Piedras W of Santa Fe, 3200–5600 ft., 8 Sep. 1978, *Hammel 4592* (MO).

Pilea magnicarpa A. K. Monro, sp. nov. TYPE: Panama. Coclé: El Copé, on slope and ridge W of sawmill, 5 Apr. 1978, *B. Hammel 2424* (holotype, MO; isotype, NY). Figure 4A, B.

Species *P. ecboliophyllae* Donnell Smith similis, sed inflorescentiis pistillatis longioribus, floribus pistillatis majoribus, seminibus majoribus, differt.

Herb to 60 cm, perennial; terrestrial, epiphytic or epipetric; monoecious. *Stems* erect, repent, sparsely branched, rooting at base and adventitiously where repent; internodes 7–30 × 1.5–3.0 mm, striate, drying dark brown to almost black, glabrous, cystoliths pusticulate. *Blades of leaves* at the same node of unequal length by ratio of 1:3–13, the major leaves petiolate, 32–170 × 7–65 mm, obovate, oblong, elliptic, chartaceous; adaxial surface drying green, dark green, dark brown, glabrous, cystoliths fusiform; abaxial surface drying

brown to pale green, glabrous, cystoliths fusiform, eglandular, occasionally punctate glandular; base asymmetrical, acute, cuneate, decurrent, subcordate; margin serrate, basal ⅓ to ⅔ entire; apex symmetrical, acuminate; primary venation 3-plinerved, the two lateral nerves stopping short of the leaf apex, secondary veins 8–25 pairs, 80–90° to the midrib; the minor leaves petiolate to subsessile, 7–23 × 4.5–7.0 mm, ovate, elliptic, or obovate, the margin entire or apically serrate, the apex asymmetrical, acute, obtuse, occasionally cuspidate, otherwise as major leaves; petioles unequal by ratio of 1:4–10, of the major leaves 2–10 × 1.0 mm, of the minor leaves 0.3–1.0 × 0.3–0.5 mm to inconspicuous, glabrous; stipules 0.5–1.5 × 1.0–2.5 mm, deltate, membranous, brown to gray-brown, glabrous, persistent. *Inflorescences* 3–18 per stem, unisexual, pistillate inflorescences preceding or concurrent with staminate inflorescences, peduncle and pedicels subtended by stipuliform bracts, peduncular bract 0.5–1.5 mm, ovate, pedicellular bracts 0.5–0.8 mm, narrowly ovate; staminate inflorescences solitary, 5–35 mm, bearing 11–50 flowers in a loose panicle; peduncle ⅓ to ½ inflorescence length, 0.5–0.8 mm diam., glabrous; pedicels 1–2 × 0.3 mm, glabrous; flowers in bud immediately prior to anthesis 1.5–2.0 × 1.0–1.5 mm, cream, apically green; tepals 4, 2.0–2.5 mm, obovate, glabrous; subapical appendages 0.5–1.0 mm, corniculate, glabrous; stamens 4, filaments ca. 1.0 mm, anthers ca. 0.5 × ca. 1.0 mm; pistillate inflorescences 1 or 2 per axil, 7–30 mm, bearing 4–30 flowers in a semi-compact head; peduncle ⅔ inflorescence length, ca. 0.5 mm diam., glabrous; pedicels 0.5–0.8 × 0.3–0.5 mm, glabrous; flowers 1.0–1.8 × 0.5–0.8 mm, glabrous; tepals 3, unequal, the central one 1–2 mm, oblong to spatulate, the apex reflexed, the lateral two 0.8–1.5 mm, ovate, the apex not reflexed. *Infructescences* 15–30 mm, peduncle 0.5 mm diam.; fruit 2.0–2.5 × 1.5 mm, compressed ovoid, the margin apically and ventrally flattened.

Distribution. Forest at an altitude of 350–1400 m in Coclé, Panamá, and San Blas departments of central Panama.

Discussion. This species falls within Weddell's *Heterophyllae* and Killip's *Centradenioideae* species groups. *Pilea magnicarpa* most closely resembles *P. ecboliophylla*, which is found throughout Mesoamerica; it may be distinguished from the latter as summarized below:

P. ecboliophylla: V- and Y-shaped cystoliths present on adaxial leaf surface, abaxial surface minute punctate glandular; pistillate inflorescences 1–4 mm; infructescences 2.5–6.0 mm, fruits 0.8–1.0 mm.

P. magnicarpa: V- or Y-shaped cystoliths absent, abaxial leaf surface eglandular, rarely punctate glandular; pistillate inflorescences 7–30 mm; infructescences 15–30 mm, fruit 2.0–2.5 mm.

To a lesser extent this species also resembles *P. chiriquina* Killip from Costa Rica and Panama, but may be distinguished as outlined below:

P. chiriquina: staminate flowers 15–200 per inflorescence, borne in 1–4 compact heads; pistillate inflorescences 2.0–8.5 mm.

P. magnicarpa: staminate flowers 11–40 per inflorescence, borne in a loose panicle; pistillate inflorescences 7–30 mm.

Paratypes. PANAMA. **Coclé:** El Copé, along gravel road to the right before sawmill, 2400 ft., 18 Oct. 1979, *Antonio 2180* (MO); road to Fortuna Dam site N of Gualaca, 22.7 mi. beyond the bridge over Río Estí, 1400 m, 22 Nov. 1979, *Antonio 2767* (MO); Alto Calvario cloud forest, 5.3 m above El Copé, above sawmill, on continental divide, 930 m, 6 Dec. 1979, *Antonio 3035* (MO); vicinity El Copé, 5–6 mi. N of El Copé, along trail which leads into the lowlands from old Riviera saw works area, 08°38′N, 08°35′W, 600–800 m, 8 July 1994, *Croat & Zhu 77220* (BM, MO not seen); 7 km N of El Copé de Veraguas, circa Rivera sawmill, Alto Calvario, ca. 900 m, continental divide at 1300 m, 11 Jan. 1977, *Folsom 1212* (MO); lumber camp at Alto Calvario, 7 km N of El Copé, ca. 900 m, 14 Jan. 1977, *Folsom 1266* (MO); summit, Alto Calvario, 7+ km N of El Copé, 850 m, 19 May 1977, *Folsom & Button 3288* (MEXU, MO not seen); near continental divide along lumbering road 8.4 km above El Copé (1 km beyond sawmill), 900 m, 19 Jan. 1978, *Hammel 950* (MO); near continental divide along lumbering road, 2.2 km beyond sawmill in forest along lumber road above El Copé, 900 m, 20 Jan. 1978, *Hammel 1031* (MO); along road from La Pindeda to El Copé by way of Piedras Gordas, sawmill above El Copé cloud forest, 3000 ft., 20 Apr. 1978, *Hammel 2613* (MO); continental divide on road to Coclecito, in patch of forest near road, 1500 ft., 20 June 1978, *Hammel 3481* (MO); continental divide N of Penonome on road to Coclesito small patch of forest at roadside, 1600 ft., 25–26 July 1978, *Hammel 4014* (MO); sawmill above El Copé, in forest along stream E of sawmill, Atlantic drainage, 2300 ft., 27 July 1978, *Hammel 4138* (MO). **Panamá:** Llano–Cartí road, 1 mi. past sawmill on dirt road, 11 Nov. 1979, *Antonio 2550* (BM, MO). **San Blas:** El Llano–Cartí road, 12 mi. from Pan American Highway, along deeply shaded large stream, 350–400 m, 10 May 1981, *Sytsma & Andersson 4495* (MO).

Acknowledgments. I thank Helen Greenop for the illustrations, Dennis Adams (BM), William Burger (F), Sandy Knapp (BM), Amy Pool (MO), and Karen Sidwell (BM) for help with the preparation of the manuscript, and Norman Robson (BM) for help with the Latin diagnoses. I also thank the curators at C, F, GH, MEXU, MO, NY, P, and US for the loan of specimens.

Literature Cited

Adams, C. D. 1970. Notes on Jamaican Flowering Plants 1. Mitt. Bot. Staatssamml. München 8: 99–110.

———. 1972. Flowering Plants of Jamaica. Univ. of the West Indies, Mona.

Burger, W. 1977. *Pilea. In:* Flora Costaricensis. Fieldiana, Bot. 40: 246–272.

Killip, E. P. 1936. New species of *Pilea* from the Andes. Contr. U.S. Natl. Herb. 26(8): 367–394.

———. 1939. The Andean species of *Pilea*. Contr. U.S. Natl. Herb. 26(10): 475–530.

Standley, P. C. & J. C. Steyermark. 1952. *Pilea. In:* Flora of Guatemala. Fieldiana, Bot. 24(3): 410–422.

Weddell, H. A. Monographie de la famille des Urticacées. Arch. Mus. Hist. Nat. 9: 1–400. 1856; 401–591. 1857.

———. 1869. Pp. 104–163 *in* A. De Candolle, Prodromus, systematis naturalis regni vegetabilis. 16(1). Victor Masson et fils, Paris.